Dr. Magnus presents a chart for the use of physicians and instructors, showing the main points with regard to the motion of the eyes that one ought to retain. The main laws of motion of Donders, Helmholtz, Listing, etc., are given; then a cut illustrating the origin of the motor nerves of the eye. This is followed by a table giving the origin, course, insertion, axis of rotation, etc., for each muscle of the eye. The second part of the chart explains very clearly the effect of paralysis of each of the muscles; how such paralysis limits motion of the eye; what position the eye assumes; whether double images arise, and how they are placed; and so on. The chart shows careful preparation, and will doubtless be widely used.

The Journal of Morphology. Ed. by C. O. Whitman, with the co-operation of Edward Phelps Allis, Jun. Vol. I., No. 1. Sept., 1887. Boston, Ginn & Co. 8°.

The new zoölogical periodical, the first number of which has been so long expected, has at last made its appearance in the shape of a thick and handsome volume of more than two hundred pages, issued from the well-known press of Messrs. Ginn & Co. of Boston. It has been delayed almost unpardonably long, and yet its make-up and the character of its contents compel us to forget the delay, and confess that it was well worth waiting for. The plates alone would make the journal unique among American periodicals devoted to the subject; for they are mostly from the hands of Werner and Winter, the Frankfort (Germany) lithographers, whose names alone are ample guaranty of excellence. In brief, the journal appears to us admirable in almost every particular. The paper is good; the press-work is well done; the minor details of arrangement of footnotes, titles, headings, etc., give evidence of care and forethought.

In this periodical we have a substantial token of the progress of two distinct undertakings of which all American scientists ought to be proud. The first is that of Dr. Whitman, the editor, whose hope and struggle for many months have been to set going in the right way a zoölogical periodical that shall worthily represent American morphologists before the world, and be a suitable outlet for our strong and increasing zoölogical literature. Professor Whitman has certainly succeeded in making a good start.

A word is due also to the publishers, Messrs. Ginn & Co., for their courage in undertaking such a periodical, which can never be expected to be a financial success, as the demand must always be extremely limited. The difficulty of establishing such a journal will be the better understood when we consider that the proceedings of societies, supported by large endowments, meet with practically no sale, but are distributed throughout the world by exchange, and furnish a very excellent means for the placing on record of such papers as are given in this magazine.

The other undertaking is that of Edward Phelps Allis, Jun., of Milwaukee, with whose co-operation the journal is edited by Dr. Whitman. Mr. Allis first formed, and then put into active operation, the idea of a private biological laboratory of research. For this he was fortunate to secure Dr. Whitman as director, and to it the name of the 'Lake Laboratory' has been given. Besides the director, Mr. Allis has added to his laboratory Dr. William Patten as assistant, and it is understood that Mr. Allis is himself at work upon important investigations.

NOTES AND NEWS.

In September a school of Oriental languages was opened at Berlin, the object of which is to give merchants and civil officers an opportunity to learn the languages of Asia and Africa. The staff of the school consists of two teachers of the Arabian language, while Persian, Chinese, Suaheli, and Herero have one teacher each. These have studied the languages they teach in the country where it is spoken, and they are assisted by natives. This school will undoubtedly prove of great value to the commerce of Germany with the countries of Asia and Africa. The merchant or consular official who understands and speaks the language of the country in which he lives and works will have a great advantage over competitors who have to make use of the service of interpreters. Formerly students had the opportunity of studying Oriental languages at German universities, but there they were taught from an exclusively scientific point of view; and it is well known that a language learned in this way, though its grammar may be well mastered, is of no practical value to the student, particularly where the difference between the written and spoken languages is great, and where the dialects are numerous. In the new school the languages are taught as living languages, and this gives the institute its principal importance.

— The semi-annual session of the National Academy of Sciences will be held at Columbia College, Nov. 8, at noon, and continue for three or four days.

— The question of teaching physiology and hygiene to elementary classes in the public schools is one that is far from a successful solution. With a criminal rashness, legislatures have been induced to prescribe alcohol-teaching as a requirement, and the result has been to create noxious temperance-tracts with a smattering of physiology attached, instead of scientific text-books. A very great improvement in this direction is a recently issued primer of health lessons by Dr. Jerome Walker. Around the main facts of physiology, the author has woven an attractive text, fully and well illustrated, and has given the subject that kind of interest which healthy children appreciate. He has very much reduced the space usually allotted to alcohol and narcotics, but it may be questioned whether the reduction is sufficient. A few very objectionable passages (considering the age of the children to whom the book is addressed) still remain. On the whole, Dr. Walker has set an example in the right direction, and the instruction to teachers is not the least valuable chapter in the book.

— One of the subjects discussed at the annual meeting of the French Association for the Advancement of Science, which has just been held at Toulouse, was the project for making a maritime canal between Bordeaux and Narbonne. The different phases of this project, which was first mooted twenty years ago, were passed in review by M. Wickersheimer, deputy for one of the departments through which the canal will pass. The latest project was prepared this summer by a company which has been formed for the purpose of making the preliminary survey; and according to this scheme, the canal, which would be about three hundred and thirty miles in length from sea to sea, would start from the western side of Bordeaux, and follow the left bank of the Garonne for a distance of fifty miles, crossing that river at Castel-Sarrasin by a *pont-canal* (or aqueduct), and follow the right bank of the river as far as Toulouse, where a large port would be created. From Toulouse to the Mediterranean seaboard at Narbonne, the maritime canal would be quite independent of the railway from Bordeaux to Cette, but it would twice cross the Canal du Midi. The curves of the canal would be of the same radius as those in the Suez Canal; that is to say, not less than 6,000 feet, and there would be 38 locks, the fall of which would range from 20 feet to 30 feet. The depth would be about 24 feet, but if the minister of marine should determine to make use of it for the first-class ironclads of the French navy, contrary to what was originally determined, the company will be prepared to make it three feet deeper. It is estimated that the mean speed of vessels passing through the canal will be seven miles an hour, and they would be drawn by locomotives running along a line of rails placed on the banks, a force of from 1,000 to 1,200 horse-power being required to produce this rate of speed. The canal is to be lighted by electricity, the electric light being generated upon the engines used for the traction of the vessels. The total cost is estimated at £130,000,000, or less than half of the estimate originally prepared. The distance saved for vessels coming from the western ports of France into the Mediterranean would be 680 miles.

— It is noted in the *Journal of the Society of Arts*, London, that while the consumption of the other dietetic articles used for beverages — tea, coffee, and chiccory — show a decline last year, cocoa is marked by a considerable increase. This is remarkable, since for about four years, from 1875 to 1879, it remained pretty stationary at about 10,000,000 pounds, but after 1880 it began to make steady progress, advancing from 10,500,000 pounds in that year to over 15,000,000 pounds last year. Of powdered cocoa and chocolate England received 1,332,000 pounds, chiefly from Holland. She

also imported 3,211 hundredweight of husks and shells of the cocoa-bean, which are also used up for cheap cocoa. There are about ten chocolate and cocoa manufacturers in Holland, whose yearly requirements of cocoa-beans may be estimated at 3,000 tons, in round numbers, principally of Guayaquil, Caracas, and Domingo kinds. They mostly manufacture cocoa preparations, known by the name of soluble cocoa, cocoatine, and cocoa-powder; viz., the roasted and powdered cocoa-beans deprived of most of their natural fat, or the cocoa-butter, which is used as a valuable ingredient by manufacturers of chocolate and cocoa sweetmeats, and also for pharmaceutical preparations. In the early part of last month no less than twenty-five tons of this cocoa-butter was sold in Holland, and fifty tons in London. The oldest of the Dutch cocoa-works was founded on a small scale more than a century ago, and most of the other works have existed from forty to sixty years; but all of them remained insignificant until the before-mentioned powdered preparations found their way to foreign countries, especially England and Germany, where certain Dutch brands of powdered cocoa have been very well received and enjoy a large sale. There are people who suppose that the superiority of the Dutch cocoa-powder is to be attributed to a peculiar mode of manufacture, different from the methods followed in other countries. The idea to extract the fat from the roasted cocoa-beans, and to sell the powder, is said to have originated in the brain of a Dutch chocolate-maker about 1830. It is now generally practised in France and England. The average consumption in the United Kingdom last year, per head of the population, was, of cocoa, 0.41 pounds; coffee, 0.86; tea, 4.87. Tea brings into the revenue £4,500; coffee, only £200,000; and coffee mixtures and chiccory, £5,273. The latter seem to be declining.

LETTERS TO THE EDITOR.

*** The attention of scientific men is called to the advantages of the correspondence columns of* SCIENCE *for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Recent Methods in the Study of Bryozoa.

IN *Science* for Oct. 7, Prof. Joseph F. James refers to certain new methods in the study of *Bryozoa*, and doubts their efficacy in classification; he also refers to a forthcoming publication which shall make this clear. Pending the publication of this paper by my esteemed friend, I cannot help expressing my decided approval of the methods he calls in question. Theoretically, development has proceeded in two lines, — one internal, to accommodate itself to the needs of internal function; and one external, to accommodate itself to environment, to the world with which the being comes in contact. Variations of function are far less frequent than those of environment: hence internal structure may still be very similar when external features have already extensively varied. Hence internal structure usually furnishes the reliable characters, which distinguish genera and higher groups; external features are used for specific determination.

Very few who have practically attempted the classification of paleozoic *Bryozoa* into genera as defined according to the old method have failed to see that such genera contained heterogeneous assemblages of forms, often ran into each other, and contained no distinct positive characters which were useful when great numbers of *Bryozoa* were to be classified. The new method has furnished solidity to this structure. The species fall into easily recognized groups, as distinct as those of other organisms on the same scale of development; all this simply because of the abandonment of external characteristics in the distinguishing of genera, for those of an internal nature, made easily accessible by the slide and the microscope.

In this department of study, Prof. H. A. Nicholson took the first decided stand, and is still contributing at short intervals valuable papers on this interesting group of fossils; but I believe that to one of our fellow-countrymen, Mr. E. O. Ulrich, belongs the credit of the perfection of this system. His work, which expresses his matured views on this subject, is now in the press, forming a part of Vol. VIII. of the forthcoming 'Illinois Report.' By his kindness I have been permitted to see plates, and furnished with private extracts from the same, and I feel free to say that it will be a monumental work in history of the study of *Bryozoa*.

The practical test of the theory of development, which holds good everywhere else in animated nature, is also satisfactory here. Instead of artificial we have natural classification, and that also of a more definite and practical form. It remains to be seen whether microscopic sections are sufficient to determine the species. A circumstance peculiar to *Bryozoa* makes this in almost all cases possible. The form, size, and arrangement of cells may be readily seen in tangential section; the presence of interstitial cells may also be thus discovered; whereas the little elevations or low spines around the apertures of some cells may be seen in the sections as spiniform tubuli. Elevated patches of cells may usually be recognized by the local increased size of cells in the sections, and maculæ will be shown by judicious longitudinal sections.

It remains to be seen what characters of specific importance cannot be shown in microscopic sections. One of these is the size of the specimen; another, its method of branching; a third, its general contour. These may all be expressed by a simple drawing, taking no cognizance of individual cells. Besides the details above referred to, microscopic slides will of course furnish numerous others referring to internal structure alone. The fact, however, is, that not only do microscopic slides reveal the characteristic features of the surface, but they often reveal them in a much better way than the specimens at hand; for these may be abraded, perhaps ever so little, but just enough to rub away the little spines, or to remove the walls of interstitial cells, and, by thus exposing the diaphragms of the same, lead to the conclusion that they do not exist. Any one who has ever looked over a quart-measure of specimens without finding one suitable for description will know what this means.

As regards the publication of Mr. Foord, 'Contributions to the Micro-Paleontology of the Cambro-Silurian Rocks of Canada,' it is an excellent exemplification of the *methods* (for this is what Professor James criticises) of the advanced school of students of the *Bryozoa*, and is a practical recognition of the merits of a work done by an American paleontologist. All of the species figured are accompanied by magnified sections of the same, and all except *Monticulipora Westoni* have also figures of the specimen's natural size; and perhaps the shape of that species, "Zoarium irregularly hemispherical," would not be difficult to grasp by the working paleontologist. The fact that Prof. H. A. Nicholson, immediately after the separation of Mr. Foord from the Geological Survey of Canada, was pleased to publish papers conjointly with that gentleman, serves to show what that eminent authority's opinion as to the merits of Mr. Foord's specific work was.

These remarks I hope represent fairly the claims of the new school as to the advantages of their methods of study. One observation alone remains to be made. I suppose that Professor James was not in earnest when he objected to the new method on account of the difficulty of making slides, no more than the physicist who should object to the advance made in his science simply on account of some of the refined mechanisms now used in his department, no more than the student of *Entomostraca* who should object to the classification reached in his science from the difficulty in finding a specimen which is willing to be quiet enough to let itself be accurately drawn. He simply expresses the difficulty he finds in leaving his old methods of study and adapting himself to new ones, and this accidentally escaped into print, not in the form in which he would be willing to have it remain at second thought. But the truth is, that microscopic slides are not difficult to make. Messrs. W. F. and John Barnes of Rockford, Ill., manufacture an instrument which I know from experience to be both cheap and useful. The specimen to be cut is ground with emery until a plane is formed having the same direction as the intended section. Then successively finer grades of emery are used until a fine polish is obtained, which can be made very fine indeed by using polishing-powder sprinkled over a piece of plate glass. Then the specimen is carefully washed, dried, and glued with Canada balsam to the slide which is to retain the specimen. Then the specimen is ground away until only a thin sheet remains fastened in the Canada balsam, after which it is again smoothed, washed, and protected by a thin cover-glass. Forty to sixty slides can be made in a day.